Kunio MITUI*: Chromosome studies on Japanese ferns (3)

三井 邦男*: 日本のシダの染色体の研究 (3)

This investigation is a sequel to two former papers concerning the chromosome numbers of Japanese ferns (1965, 1966). The materials were fixed and prepared according to the methods described in the previous papers. Tab. 1 is an arrangement of the results in 37 species belonged to 20 genera. I wish to express my sincere appreciation to Prof. H. Ito for his kind advice and for the identification of the materials.

Notes

Dryopteris *D. erythrosora* var. *koidzumiana* is a variety distributed in Japan (Hatizyo Isl.), the Ryukyus, and Formosa. The differences between var. *koidzumiana* and var. *erythrosora* are shown in the shape of the frond and the quantity of the scales on the stipe and the rachis. Both the somatic and the gametic chromosome number of var. *erythrosora* are 123, and it is considered that the variety must be triploid and apogamous (Kurita, 1962). Obviously this triploid is originated from the diploid and the tetraploid parents. There are many species and varieties which are considered as parents of var. *erythrosora*. Var. *koidzumiana* has gametic chromosome number 41 and many common characters with var. *erythrosora*. From these facts it may be supposed that this variety is one of the parents of var. *erythrosora*. More cytological studies on many species or varieties which have close morphological resemblances to var. *erythrosora*, are necessary for the investigation of the origin of var. *erythrosora*.

Vandenboschia Three varieties of *V. radicans* are found in Japan and her adjacent regions, namely var. *orientalis* var. *naseana* and var. *nipponica* (H. Ito, 1949). The gametic chromosome number of var. *orientalis* is 72 (Mitui, 1966). On the other hand, it is 36 in var. *naseana* (this report). Thus, it is conjectured that var. *orientalis* may be derived from var. *naseana*. Furthermore, var. *orientalis* which has somatic chromosome number 108, was found in Yakusima Isl. This shows 36 bivalents and 36 univalents at meiosis and the spores seem to be sterile. Morphologically this is var. *orientalis*, but cytologically it must be hybrid. One of the parents of this specimen is undoubtedly var. *orientalis* and the other may be

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Tab. 1. A list of chromosome numbers of some Japanese ferns.

Name of species	Locality	Haploid chromosome number	Ploidy	Fig.
Acrophorus stipellatus	Kosugidani, Yak.*	41	2X	1
Asplenium wrightii	Nagata, Yak.	144	8X	2
Athyrium lobatocrenatum	Cultivated in Tokyo Gakugei Univ.	$59_{\mathrm{I}}\ 82_{\mathrm{II}}$		3
A. nakanoi	T. U. E.* (Kosugidani Yak.)	80	4X	4
A. reflexipinnum	Kosugidani, Yak.	80	4X	5
Colysis shintenensis	Nagata, Yak.	$15_{\mathrm{I}}\ 42_{\mathrm{II}}$	3X	6
C. wrightii	Sumiyo, Amam.*	36	2X	7
Crepidomanes makinoi	Yugasima, Sizuoka Pref.	36	4X	8
Diplazium donianum	T. U. E. (Sumiyo, Amam.)	164	2X Apog.	9
D. tomitaroanum	U. T.*	123		10
Dryopteris erythrosora var. *koidzumiana*	Yuwan, Amam.	41	2X	11
D. hendersonii	Kosugidani, Yak.	41	2X	12
D. hondoensis	U. T.	123	3X Apog.	13
D. sordidipes	Nagata, Yak.	41	2X	14
Lastrea angulariloba	Nagata, Yak.	c. 62	4X	15
L. japonica var. *musashiensis*	Ozakusan, Totigi Pref.	31	2X	16
L. thelypteris	Hinohara, Tokyo Pref.	36	2X	17
Lemmaphyllum microphyllum	Kuroyama, Saitama Pref.	36	2X	18
Mecodium wrightii	Okukinu, Totigi Pref.	27	2X	19
Monachosorum flagellare	Ozakusan, Totigi Pref.	c. 155		20
Neocheiropteris ensata	T. U. E. (Owase, Mie Pref.)	72	4X	21
Phegopteris decursivepinnata	Agano. Saitama Pref.	$30_{\mathrm{I}}\ 30_{\mathrm{II}}$	3X	22
P. subaurita	Nase, Amam.	31	2X	23
Polystichopsis mutica	Isizukayama, Yak.	41	2X	24
Polystichum hancockii	Sumiyo, Amam.	41	2X	25
P. lepidocaulon	Mituisiyama, Tiba Pref.	41	2X	26
P. polyblepharum var. *intermedium*	Hasimoto, Kanagawa Pref.	82	4X	27
P. pseudomakinoi	Mituisiyama, Tiba Pref.	c. 80	4X	28
Pteris dispar	Nase, Amam.	29	2X	29
P. oshimensis	Nisinakama, Amam.	87	3X Apog.	30
P. ryukyuensis	Sumiyo, Amam.	58	4X	31

P. tokioi	Nagata, Yak.	58	4x	32
Selenodesmium obscurum	Yanma, Amam.	33	2x	33
Stegnogramma gymnocarpa subsp. *amabilis*	Sumiyo, Amam.	36	2x	34
Vandenboschia radicans var. *naseana*	Nagata, Yak.	36	4x	35
var. *orientalis*	Nagata, Yak.	36_{I} 36_{II}		36
Woodwardia orientalis var. *formosana*	Sumiyo, Amam.	34	2x	37

*(Abbreviations) Amam.: Amani Osima, Kagosima Pref. Yak.: Yakusima, Kagosima Pref. T. U. E.: Fern garden of Tokyo University of Education. U. T.: Koisikawa Botanical Gardens of University of Tokyo.

var. *naseana* from the view points of morphological characters. Accordingly, var. *orientalis* and var. *naseana* have a common genome, and var. *orientalis* must be autopolyploid or allopolyploid of var. *naseana.* Although the comparison of spore and somatic cell sizes have not yet made, it is supposed that var. *orientalis* may be autopolyploid of var. *naseana* from the morphological resemblances. This hybrid (var. *naseana*×var. *orientalis*) is distinguished morphologically and cytologically from var. *nipponica.* The detailed cytological investigations on var. *nipponica* have not yet done, but one specimen collected in Sado Isl. showed several multivalent chromosomes at meiosis, whereas the hybrid (var. *naseana*×var. *orientalis*) showed 36 bivalents and 36 univalents having sterile spores.

Phegopteris *P. decursivepinnata* has two cytotypes: diploid and tetraploid. The latter is the autotetraploid derived from the former (Mitui, 1966). In this paper it became clear that there is a new cytotype, autotriploid race. This race was intermixed among diploid and tetraploid races. Cytologically it shows 30 univalents and 30 bivalents at diakinesis and no multivalent chromosomes were found, as in autotetraploid race.

Athyrium *A. lobatocrenatum* shows approximately 59 pairs and 82 single chromosomes at meiosis and the distribution of chromosomes is irregular and the formation of spores is unsuccessful. Thus, this species seems to be hybrid. From the degree of pairing of chromosomes, it may be thought that both species of the parents of this species are not closely related.

Diplazium *D. tomitaroanum* has the same chromosome number as *D. subsinuatum* (n=123, Mitui, 1965), but there is a little difference in spore formation. *D. tomitaroanum* has 16 spore mother cells or less in a sporangium and usually

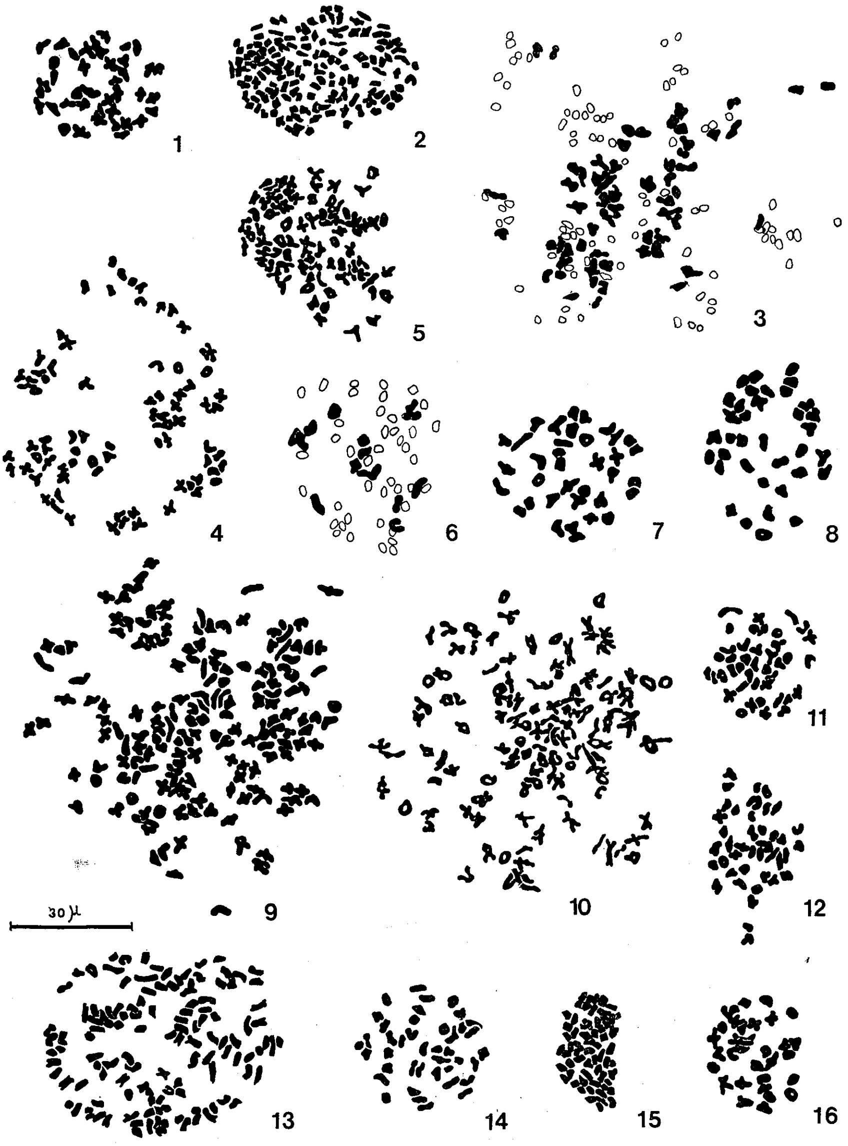

Fig. 1—16. Numbers correspond to those in tab. 1.

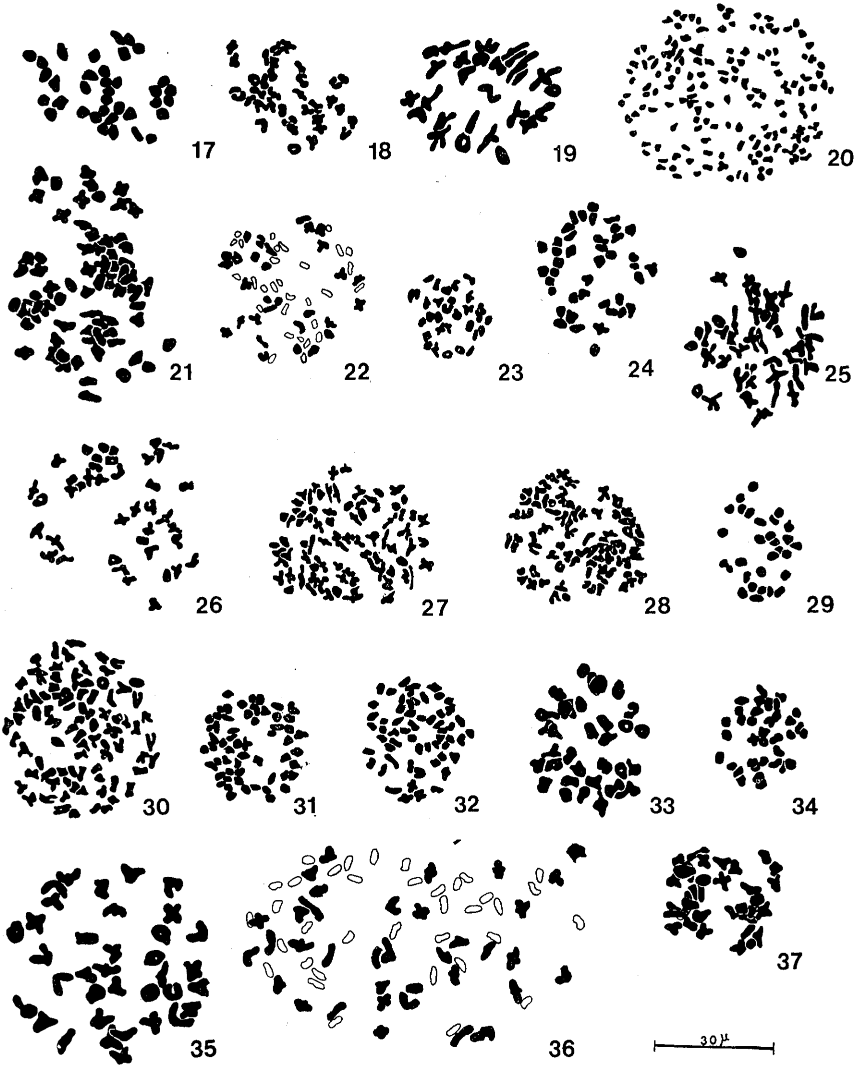

Fig. 17-37. Numbers correspond to those in tab. 1.

contains many withering spores contrary to *D. subsinuatum* which has 16 spore mother cells and 64 perfect spores in a sporangium.

Lastrea *L. japonica* has gametic chromosome number 62 (Kurita, 1960),

but it is confirmed that *L. japonica* var. *musashiensis* has gametic chromosome number 31. Therefore, it may be supposed that *L. japonica* is an autotetraploid derived from var. *musashiensis* from the morphological resemblances.

References

Kurita, S. 1960. Journ. Jap. Bot. **35**: 269-272. ———, 1961. Bot. Mag. Tokyo **74**: 395-401. Ito, H. 1949. Journ. Jap. Bot. **24**: 121-127. Mitui, K. 1965. Journ. Jap. Bot. **40**: 117-124. ———, 1966. ibid. **41**, 60-64, 270-276.

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日本産シダの 37 種類の染色体数を発表する。表 1 と図（1—37）がその詳細である。これらのうちでゲジゲジシダには前に報告した二倍体四倍体のほかに三倍体も存在することがわかった。さらにホコザキベニシダ (n=41) やイワハリガネワラビ (n=31) やオオハイホラゴケ (n=36) は，それぞれベニシダ (n=123)，ハリガネワラビ (n=62,) ハイホラゴケ (n=72) の起源を示すような染色体数を持つことがわかった。

○団地サイズの台紙とカバー（伊藤洋）Hirosi Ito: Economical size herbarium paper

昔ピースの贈答用 10 個入りというのがあって，5 個ずつ並んで 2 列，平らな箱にすきまなく収まっていた。その中から 1 個抜き取り残りを 3 個ずつ 3 列に並べておくといういたずらがあった。ところがその結果は，縦方向ではほとんど同じく，横方向でも 4 本のすきまを合わせて 1cm ちょっとだから，気づかれずにすむことも多かった。さて最近ある博物館で模造紙八つ切りの標本台紙を注文したところ，納品された紙が何となく寸たらずのようにみえたので，計ってみると九つ切り，つまり 3×3 であることがわかった。8 枚のところを 9 枚とって一もうけしようと思った紙屋はとんだ寸法ちがいでおしゃかを出してしまったが，こちらは意外なことに気がついた。すなわちこの九つ切りの寸づまりの台紙（団地サイズと呼ぶことにしよう）を使用するとカバー（属や科ごとに何枚かの標本をはさんで整理する大きな紙）が非常に経済的だということである。カバーは台紙より一まわり大きくなければならないので，普通の八つ切りやそれより大きい新聞紙四つ折り大（東大などで使っているもの）の台紙の場合ではカバーは全紙から 2 個しかとれない（むだな切り落としがたくさん出る）が，団地サイズの台紙だと全紙からむだなくカバーが 4 個とれる。つまり半額の値段になる。この調子で標本戸だななども万事安上がりというわけで，小規模なハーバリウムには適しているのではないかと思う。なお台紙の寸法は八つ切り 275mm×395mm，団地サイズ 263mm×366mm で，そんなに小さすぎるようにも思えない。

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